WHAT IS CLAIMED IS:

1	1. A photoresist copolymer derived from a mixture of monomers
2	comprising:
3	(a) two or more alicyclic olefin derivatives of the formula:
4	<chemical 4="" formula=""></chemical>
	R ₆
5	R_2 R_3
6	wherein
7	k and n is independently 1 or 2;
8	p is an integer from 0 to 5;
9	R ₅ and R ₆ are independently hydrogen or methyl; and
10	R ₁ , R ₂ , R ₃ , and R ₄ individually represent hydrogen, straight or branched
11	C_{1-10} alkyl, straight or branched C_{1-10} ester, straight or branched C_{1-10} ketone, straight or
12	branched C_{1-10} carboxylic acid, straight or branched C_{1-10} acetal, straight or branched C_{1-10}
13	alkyl including at least one hydroxyl group, straight or branched C ₁₋₁₀ ester including at
14	least one hydroxyl group, straight or branched C ₁₋₁₀ ketone including at least one hydroxy
15	group, straight or branched C ₁₋₁₀ carboxylic acid including at least one hydroxyl group,
16	and straight or branched C ₁₋₁₀ acetal including at least one hydroxyl group,
17	wherein, at least one of R ₁ , R ₂ , R ₃ , and R ₄ represent straight or branched
18	C_{1-10} alkyl including at least one hydroxyl group, straight or branched C_{1-10} ester including
19	at least one hydroxyl group, straight or branched C_{1-10} ketone including at least one
20	hydroxyl group, straight or branched C_{1-10} carboxylic group including at least one
21	hydroxyl group, straight or branched C_{1-10} acetal including at least one hydroxyl group;
22	and
23	(b) a cross-linking monomer of the formula:
e	R' C=0

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25 wherein

each of R' and R" is independently hydrogen or methyl;

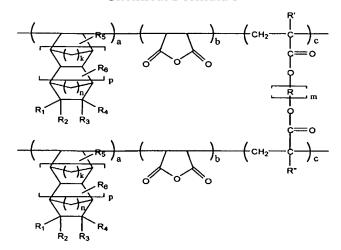
27 m is an integer from 1 to 10; and

28 R is straight or branched C₁₋₁₀ alkyl, optionally comprising an ester, a

29 ketone, a carboxylic acid, an acetal, a hydroxyl group or a combination thereof.

- 1 2. The photoresist copolymer according to claim 1, wherein said 2 mixture of monomers further comprises maleic anhydride.
- 1 3. The photoresist copolymer according to claim 1 of the formula:

2 <Chemical Formula 5>



3

4 wherein

5 k, m, n, p, R, R₁, R₂, R₃, R₄, R₅, R₆, R', and R" are those defined in Claim 1; and the ratio

6 a:b:c is 1-50 mol%: 10-50 mol%: 0.1-20 mol%.

- 1 4. The photoresist polymer according to claim 3 comprising
- 2 poly(maleic anhydride / 2-hydroxyethyl 5-norbornene-2-carboxylate / tert-butyl 5-
- 3 norbornene-2-carboxylate / 5-norbornene-2-carboxylic acid / 1,3-butanediol diacrylate);
- 4 or poly(maleic anhydride / 2-hydroxyethyl 5-norbornene-2-carboxylate / tert-butyl 5-
- 5 norbornene-2-carboxylate / 5-norbornene-2-carboxylic acid / 1,4-butanediol diacrylate).
- 1 5. A process for preparing a photoresist copolymer comprising
- 2 admixing at least two alicyclic monomers, a cross-linking monomer and a polymerization
- 3 initiator under polymerization reaction conditions sufficient to produce the photoresist
- 4 copolymer, wherein the alicyclic monomer is of the formula:



56 wherein

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7 k and n is independently 1 or 2;

p is an integer from 0 to 5;

9 R₅ and R₆ are independently hydrogen or methyl; and

10 R₁, R₂, R₃, and R₄ individually represent hydrogen, straight or branched

 C_{1-10} alkyl, straight or branched C_{1-10} ester, straight or branched C_{1-10} ketone, straight or

branched C₁₋₁₀ carboxylic acid, straight or branched C₁₋₁₀ acetal, straight or branched C₁₋₁₀

alkyl including at least one hydroxyl group, straight or branched C₁₋₁₀ ester including at

least one hydroxyl group, straight or branched C₁₋₁₀ ketone including at least one hydroxyl

group, straight or branched C_{1-10} carboxylic acid including at least one hydroxyl group,

and straight or branched C_{1-10} acetal including at least one hydroxyl group,

wherein, at least one of R₁, R₂, R₃, and R₄ represent straight or branched

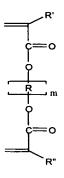
 C_{1-10} alkyl including at least one hydroxyl group, straight or branched C_{1-10} ester including

19 at least one hydroxyl group, straight or branched C_{1-10} ketone including at least one

20 hydroxyl group, straight or branched C₁₋₁₀ carboxylic group including at least one

21 hydroxyl group, straight or branched C₁₋₁₀ acetal including at least one hydroxyl group;

and the cross-linking monomer is of the formula:



2324

28

wherein

each of R' and R" is independently hydrogen or methyl;

26 m is an integer from 1 to 10; and

27 R is straight or branched C_{1-10} alkyl, optionally comprising an ester, a

ketone, a carboxylic acid, an acetal, a hydroxyl group or a combination thereof.

1	6. The process for preparing a photoresist copolymer according to
2	claim 5, wherein the polymerization reaction is carried out under an atmosphere of
3	nitrogen or argon.
•	7 The new case for menoring a photogogist conclumer aggording to
1	7. The process for preparing a photoresist copolymer according to
2	claim 5, wherein the polymerization reaction is carried out at a temperature between 60°C
3	and 130°C.
1	8. The process for preparing a photoresist copolymer according to
2	claim 5, wherein the polymerization reaction is carried out under the pressure between
3	0.0001 and 5 atm.
1	9. The process for preparing a photoresist copolymer according to
2	claim 5, wherein the admixture further comprises an organic solvent selected from the
3	group consisting of cyclohexanone, methyl ethyl ketone, benzene, toluene, dioxane,
4	tetrahydrofuran, propylene glycol methyl ether acetate, dimethylformamide, and a
5	mixture thereof.
1	10. The process for preparing a photoresist copolymer according to
2	claim 5, wherein the polymerization initiator is one or more compound(s) selected from
3	the state of the s
_	the group consisting of 2,2-azobisisobutyronitrile (AIBN), acetyl peroxide, lauryl
4	the group consisting of 2,2-azobisisobutyronitrile (AIBN), acetyl peroxide, lauryl peroxide, tert-butyl peracetate, tert-butyl hydroperacetate and tert-butyl peroxide.
4	peroxide, tert-butyl peracetate, tert-butyl hydroperacetate and tert-butyl peroxide.
4	peroxide, tert-butyl peracetate, tert-butyl hydroperacetate and tert-butyl peroxide. 11. The photoresist composition comprising (i) a photoresist
4	peroxide, tert-butyl peracetate, tert-butyl hydroperacetate and tert-butyl peroxide.
4	peroxide, tert-butyl peracetate, tert-butyl hydroperacetate and tert-butyl peroxide. 11. The photoresist composition comprising (i) a photoresist
4 1 2	peroxide, tert-butyl peracetate, tert-butyl hydroperacetate and tert-butyl peroxide. 11. The photoresist composition comprising (i) a photoresist copolymer according to claim 1, and (ii) an organic solvent.
4 1 2	peroxide, tert-butyl peracetate, tert-butyl hydroperacetate and tert-butyl peroxide. 11. The photoresist composition comprising (i) a photoresist copolymer according to claim 1, and (ii) an organic solvent. 12. The photoresist composition according to claim 11, which further
4 1 2 1 2	peroxide, tert-butyl peracetate, tert-butyl hydroperacetate and tert-butyl peroxide. 11. The photoresist composition comprising (i) a photoresist copolymer according to claim 1, and (ii) an organic solvent. 12. The photoresist composition according to claim 11, which further comprises a photoacid generator. 13. The photoresist composition according to claim 12, wherein the
4 1 2 1 2 1 2	peroxide, tert-butyl peracetate, tert-butyl hydroperacetate and tert-butyl peroxide. 11. The photoresist composition comprising (i) a photoresist copolymer according to claim 1, and (ii) an organic solvent. 12. The photoresist composition according to claim 11, which further comprises a photoacid generator. 13. The photoresist composition according to claim 12, wherein the photoacid generator is one or more compound(s) selected from the group consisting of
4 1 2 1 2 1 2 3	peroxide, tert-butyl peracetate, tert-butyl hydroperacetate and tert-butyl peroxide. 11. The photoresist composition comprising (i) a photoresist copolymer according to claim 1, and (ii) an organic solvent. 12. The photoresist composition according to claim 11, which further comprises a photoacid generator. 13. The photoresist composition according to claim 12, wherein the photoacid generator is one or more compound(s) selected from the group consisting of diphenyl iodide hexafluorophosphate, diphenyl iodide hexafluoroarsenate, diphenyl
4 1 2 1 2 1 2	peroxide, tert-butyl peracetate, tert-butyl hydroperacetate and tert-butyl peroxide. 11. The photoresist composition comprising (i) a photoresist copolymer according to claim 1, and (ii) an organic solvent. 12. The photoresist composition according to claim 11, which further comprises a photoacid generator. 13. The photoresist composition according to claim 12, wherein the photoacid generator is one or more compound(s) selected from the group consisting of

7 triphenylsulfonium hexafluoroantimonate, triphenylsulfonium triflate, and 8 dibutylnaphtylsulfonium triflate. 1 14. A process for forming a photoresist pattern, which comprises the steps of (a) coating a photoresist composition according to claim 11 on a wafer, (b) 2 exposing the wafer to patterned light by employing an exposer, and (c) developing the 3 4 exposed wafer. 15. 1 The process for forming a photoresist pattern according to claim 2 14, wherein the step (b)is carried out by using a light source selected from the group consisting of ArF, KrF, E-beam, X-ray, EUV (extremely ultraviolet) and DUV (deep 3 4 ultraviolet). 1 16. The process according to claim 15, which further comprises baking 2 step(s) before and/or after step (b). 1 17. The process according to claim 16, wherein the baking step(s) are 2 performed at a temperature of 50°C to 200°C. 1 18. The process according to claim 14, wherein the developing step (c) 2 is carried out using an aqueous solution of TMAH (tetramethylamine hydroxide).

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19.

according to claim 14.

A semiconductor element manufactured by using a process